Abstracts

Microwave Circuits for High-Efficiency Operation of Transferred Electron Oscillators

J.F. Reynolds, B.E. Berson and R.E. Enstrom. "Microwave Circuits for High-Efficiency Operation of Transferred Electron Oscillators." 1970 Transactions on Microwave Theory and Techniques 18.11 (Nov. 1970 [T-MTT] (Special Issue on Microwave Circuit Aspects of Avalanche-Diode and Transferred Electron Devices)): 827-834.

Compact circuits for obtaining high-efficiency operation of high-power transferred electron oscillators (TEOs) in L-band are described. One is a coaxial resonator and the other employs coupled TEM lines. The circuits are shown analytically and experimentally to be capable of matching a wide range of fundamental device impedances. Provisions for independently tuning the second-harmonic impedance over a wide range are included in both types of circuits. Pulsed conversion efficiencies up to 32 percent have been obtained TEOs mounted in the coaxial resonators and up to 27 percent with TEOs in the coupled TEM-line structures. The impedance at the second harmonic has been shown quantitatively to be extremely important in controlling device efficiency. By varying the second-harmonic tuning the device performance can be varied from high-efficiency operation to no output. Oscillators using these cavities were temperature stable over a wide range. The operating frequency of TEOs in the coaxial cavity and the coupled-TEM-line cavity varied less than 30 and 40 kHz/°C, respectively, over the range from - 54°C to +125°C.

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